

AMENDMENTS TO THE CLAIMS

(with complete listing)

1-51. (Cancelled)

52. (Currently amended) In a tension leg platform having at least one buoyant pontoon forming a submerged hull defining a keel, said at least one buoyant pontoon defining an overall perimeter of said hull, said overall perimeter including first and second extremities, two or more vertical columns each having a lower end carried by the hull below the waterline and an upper end disposed above the waterline, a deck rigidly carried by the upper ends of the two or more vertical columns, a first tendon porch connected to said hull at said [[a]] first extremity of the hull at an elevation of the keel below the waterline, a second tendon porch connected to said hull at said [[a]] second extremity of the hull at an elevation of the keel below the waterline, a first vertically oriented tendon having an upper end fixed to and terminating at said first tendon porch and a lower end anchored to the seafloor, a second vertically oriented tendon having an upper end fixed to and terminating at said second tendon porch and a lower end anchored to the seafloor, two or more vertical columns each having a lower end carried by the hull below the waterline and an upper end disposed above the waterline, a deck rigidly carried by the upper ends of the two or more vertical columns, and [[a]] first, second, third, fourth and fifth vertically oriented production risers each riser disposed medially of between said first and second tendons and having a lower end connected to the seafloor, an interior fluidly coupled to a subsea well and an upper end carried by said deck, the tension leg platform, the improvement comprising:

a first keel guide having only a single vertical aperture formed therethrough for receiving said first production riser, said first keel guide being rigidly connected directly to said at least one pontoon and oriented such that said aperture of said first keel guide is disposed distally of said overall perimeter the periphery of the hull at the elevation of the keel below the waterline,

~~the keel guide defining a vertical aperture therethrough, a mid-portion of the first vertically oriented production riser longitudinally movably captured by said aperture of said first keel guide and laterally supported by the first keel guide; and~~

a second keel guide having only a single vertical aperture formed therethrough for receiving said second production riser, said second keel guide being rigidly connected directly to said at least one pontoon and oriented such that said aperture of said second keel guide is disposed distally of said overall perimeter below the waterline, a mid-portion of the second vertically oriented production riser longitudinally movably captured by said aperture of said second keel guide and laterally supported by the second keel guide;

a third keel guide having only a single vertical aperture formed therethrough for receiving said third production riser, said third keel guide being rigidly connected directly to said at least one pontoon and oriented such that said aperture of said third keel guide is disposed distally of said overall perimeter below the waterline, a mid-portion of the third vertically oriented production riser longitudinally movably captured by said aperture of said third keel guide and laterally supported by the third keel guide;

a fourth keel guide having only a single vertical aperture formed therethrough for receiving said fourth production riser, said fourth keel guide being rigidly connected directly to said at least one pontoon and oriented such that said aperture of said fourth keel guide is disposed distally of said overall perimeter below the waterline, a mid-portion of the fourth vertically oriented production riser longitudinally movably captured by said aperture of said fourth keel guide and laterally supported by the fourth keel guide;

a fifth keel guide having only a single vertical aperture formed therethrough for receiving said fifth production riser, said fifth keel guide being rigidly connected directly to said at least

one pontoon and oriented such that said aperture of said fifth keel guide is disposed distally of said overall perimeter below the waterline, a mid-portion of the fifth vertically oriented production riser longitudinally movably captured by said aperture of said fifth keel guide and laterally supported by the fifth keel guide;

a first bearing sleeve disposed about said mid-portion of said first production riser and within said aperture of said first keel guide, said first bearing sleeve vertically fixed with respect to said first keel guide, said first production riser vertically movable within said first bearing sleeve;

a second bearing sleeve disposed about said mid-portion of said second production riser and within said aperture of said second keel guide, said second bearing sleeve vertically fixed with respect to said second keel guide, said second production riser vertically movable within said second bearing sleeve;

a third bearing sleeve disposed about said mid-portion of said third production riser and within said aperture of said third keel guide, said third bearing sleeve vertically fixed with respect to said third keel guide, said third production riser vertically movable within said third bearing sleeve;

a fourth bearing sleeve disposed about said mid-portion of said fourth production riser and within said aperture of said fourth keel guide, said fourth bearing sleeve vertically fixed with respect to said fourth keel guide, said fourth production riser vertically movable within said fourth bearing sleeve;

a fifth bearing sleeve disposed about said mid-portion of said fifth production riser and within said aperture of said fifth keel guide, said fifth bearing sleeve vertically fixed with respect

to said fifth keel guide, said fifth production riser vertically movable within said fifth bearing sleeve;

at least one passive resilient tensioner carried by the deck at an elevation above the waterline, the upper ends of said first, second, third, fourth and fifth vertically oriented production risers connected to and vertically supported by said at least one passive resilient tensioner such that said upper ends of said first, second, third, fourth and fifth vertically oriented production risers moves move vertically with respect to said deck as said tension leg platform is horizontally displaced.

53. (Currently amended) The tension leg platform of claim 52 wherein,
said at least one passive resilient tensioner is a spring.

54. (Currently amended) In a method for coupling [[a]] first, second, third, fourth, and fifth production risers each having an upper end and a lower end to a tension leg platform, the tension leg platform characterized by a submerged hull that defines a keel and an overall perimeter including first and second extremities, two or more vertical columns each having a lower end carried by the hull below the waterline and an upper end disposed above the waterline, a deck rigidly carried by the upper ends of the two or more vertical columns, and first and second tendon porches connected to the first and second extremities of the hull, respectively, at an elevation of the keel below the waterline, the method including the steps of disposing first and second vertically oriented mooring tendons having upper and lower ends between the tension leg platform and the seafloor, fixing the upper ends of the first and second vertically oriented mooring tendons to the first and second tendon porches, respectively, below the waterline, anchoring the lower ends of the first and second vertically oriented mooring tendons to the seafloor, vertically orienting the first, second, third, fourth and fifth production risers between

the tension leg platform and the seafloor, connecting the lower ends of the first, second, third, fourth and fifth production risers to the seafloor, fluidly coupling [[the]] interior fluid passages of the first, second, third, fourth and fifth production risers to at least one subsea well, and suspending the upper ends of the first, second, third, fourth and fifth production risers from the tension leg platform, the improvement comprising the steps of:

rigidly directly connecting a first keel guide that is characterized by only a single vertical aperture formed therethrough to the hull at the elevation of the keel below the waterline and at a first point along the overall perimeter of said hull located medially between said first and second extremities, said first keel guide oriented such that said vertical aperture of said first keel guide is disposed distally of said overall perimeter;

rigidly directly connecting a second keel guide that is characterized by only a single vertical aperture formed therethrough to the hull at the elevation of the keel below the waterline and at a second point along the overall perimeter of said hull located medially between said first and second extremities, said second keel guide oriented such that said vertical aperture of said second keel guide is disposed distally of said overall perimeter;

rigidly directly connecting a third keel guide that is characterized by only a single vertical aperture formed therethrough to the hull at the elevation of the keel below the waterline and at a third point along the overall perimeter of said hull located medially between said first and second extremities, said third keel guide oriented such that said vertical aperture of said third keel guide is disposed distally of said overall perimeter;

rigidly directly connecting a fourth keel guide that is characterized by only a single vertical aperture formed therethrough to the hull at the elevation of the keel below the waterline and at a fourth point along the overall perimeter of said hull located medially between said first

and second extremities, said fourth keel guide oriented such that said vertical aperture of said fourth keel guide is disposed distally of said overall perimeter;

rigidly directly connecting a fifth keel guide that is characterized by only a single vertical aperture formed therethrough to the hull at the elevation of the keel below the waterline and at a fifth point along the overall perimeter of said hull located medially between said first and second extremities, said fifth keel guide oriented such that said vertical aperture of said fifth keel guide is disposed distally of said overall perimeter;

longitudinally movably capturing a mid-portion of the first production riser in the aperture of said first keel guide;

longitudinally movably capturing a mid-portion of the second production riser in the aperture of said second keel guide;

longitudinally movably capturing a mid-portion of the third production riser in the aperture of said third keel guide;

longitudinally movably capturing a mid-portion of the fourth production riser in the aperture of said fourth keel guide;

longitudinally movably capturing a mid-portion of the fifth production riser in the aperture of said fifth keel guide;

laterally supporting the first production riser by the first keel guide;

laterally supporting the second production riser by the second keel guide;

laterally supporting the third production riser by the third keel guide;

laterally supporting the fourth production riser by the fourth keel guide;

laterally supporting the fifth production riser by the fifth keel guide;

disposing a first bearing sleeve about said mid-portion of first production riser and within said aperture of said first keel guide, vertically fixing said first bearing sleeve with respect to said first keel guide, allowing said first production riser to move vertically within said first bearing sleeve;

disposing a second bearing sleeve about said mid-portion of second production riser and within said aperture of said second keel guide, vertically fixing said second bearing sleeve with respect to said second keel guide, allowing said second production riser to move vertically within said second bearing sleeve;

disposing a third bearing sleeve about said mid-portion of third production riser and within said aperture of said third keel guide, vertically fixing said third bearing sleeve with respect to said third keel guide, allowing said third production riser to move vertically within said third bearing sleeve;

disposing a fourth bearing sleeve about said mid-portion of fourth production riser and within said aperture of said fourth keel guide, vertically fixing said fourth bearing sleeve with respect to said fourth keel guide, allowing said fourth production riser to move vertically within said fourth bearing sleeve;

disposing a fifth bearing sleeve about said mid-portion of fifth production riser and within said aperture of said fifth keel guide, vertically fixing said fifth bearing sleeve with respect to said fifth keel guide, allowing said fifth production riser to move vertically within said fifth bearing sleeve;

disposing at least one passive resilient tensioner on the deck;

connecting the upper ends of the first, second, third, fourth and fifth production risers to the at least one passive resilient tensioner;

vertically supporting the first, second, third, fourth and fifth production risers by the at least one passive resilient tensioner; and

allowing by the at least one passive resilient tensioner the upper ends of the first, second, third, fourth and fifth production risers to move vertically with respect to the deck as the tension leg platform moves horizontally over said seafloor.

55. (New) A tension leg platform comprising:

a submerged hull characterized by a plan view having the shape of an octagon with four pontoons extending horizontally and radially therefrom at intervals of ninety degrees;

the distal end of each of said four pontoons having a tendon porch connected thereto at an elevation below the waterline;

each said tendon porch connected to a vertically oriented tendon with an upper end fixed to and terminating at said tendon porch and a lower end anchored to the seafloor;

a vertical column having a lower end carried by the hull below the waterline and an upper end disposed above the waterline;

a deck rigidly carried by the upper end of said vertical column;

a vertically oriented production riser having a lower end connected to the seafloor, an interior fluidly coupled to a subsea well, and an upper end carried by said deck;

a keel guide having only a single vertical aperture formed therethrough for receiving said production riser, said keel guide being rigidly connected directly to said hull below the waterline, a mid-portion of the vertically oriented production riser longitudinally movably captured by said aperture of said keel guide and laterally supported by the keel guide;

a bearing sleeve disposed about said mid-portion of said production riser and within said aperture of said keel guide, said bearing sleeve vertically fixed with respect to said keel guide, said production riser vertically movable within said bearing sleeve; and

a passive resilient tensioner carried by the deck at an elevation above the waterline, the upper end of said vertically oriented production riser connected to and vertically supported by said passive resilient tensioner such that said upper end of said vertically oriented production riser moves vertically with respect to said deck as said tension leg platform is horizontally displaced.

56. (New) The tension leg platform of claim 55 wherein:

said keel guide is disposed on an outwardly facing side of said hull.

57. (New) The tension leg platform of claim 55 further comprising:

a moon pool formed within said octagon-shaped hull, said keel guide being disposed within said moon pool.